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# BOOK ANNOUNCEMENTS

A.V. BALAKRISHNAN, managing editor; W. Hildenbrand and N.N. Vorob'ev, editorial board, Game Theory: Lectures for Economists and Systems Scientists (Translated and supplemented by S. Kotz). Applications of Mathematics 7 (Springer-Verlag, Berlin–Heidelberg–New York, 1977) 60 figs. xi+178 pp.

Translator's remark. Preface. 1. *Matrix Games*: Definition of a non-cooperative game; Admissible situations and the equilibrium situation; Strategic equivalence of games; Antagonistic games; Saddle points; Auxiliary propositions about extrema; Minimax equalities and saddle points; Matrix games; Mixed strategies; A mixed extension of a game; Existence of minimaxes in mixed strategies; Convex sets; The lemma on two alternatives; The minimax theorem; The value of the game and optimal strategies; Three properties of the value of a game; An example: $2\times 2$ games; A graphical solution of $2\times n$ games; A graphical solution of $m\times 2$ games; Sufficient criteria for the value of a game and optimal strategies; Domination of strategies; Diagonal games; Sets of optimal strategies in a matrix game; An example: $3\times 2$ games; Symmetric games; Matrix games and linear programming. 2. *Infinite antagonistic games*: Introduction and motivation; Situations of $\varepsilon$-equilibrium, $\varepsilon$-saddle points and $\varepsilon$-optimal strategies; $\varepsilon$-optimal strategies and minimaxes; Mixed strategies; Properties of the value of a game and of optimal strategies; The Helly metric; Conditionally compact games; The basic theorem for conditionally compact games; Continuous games on the unit square; Convex functions; Convex games: pure optimal strategies for player II; Convex games: optimal strategies for player I; Strictly convex games; Examples of convex games and their solutions; Market competition; Allocation of production capacities: minimization of the maximal intensity of a production scheme; Allocation of production capacities under partial uncertainty. 3. *Noncooperative games*: Mixed extension of noncooperative games; Equilibrium situations; Nash's theorem; Properties of equilibrium situations; Bi-matrix games; Solutions of bi-matrix games; Almost antagonistic games; Prisoner's dilemma; The battle of the sexes; Noncooperative games with two pure strategies for each of the players; False advertising; Preservation of ecology. 4. *Cooperative games*: Characteristic functions; Characteristic functions of noncooperative games; Properties of characteristic functions for noncooperative games; Imputations and cooperative games; Essential and inessential games; Strategic equivalence of cooperative games; Zero games; The 0–1 reduced form; Classification of cooperative games with a small number of players; Dominance of imputations; The core of a game; The core of a general three-person game; von Neumann-Morgenstern solutions; vN-M solutions for three person constant sum games; vN-M solutions for general three-person cooperative games; Shapley's vector: axiomatization; Shapley's vector: existence and determination; Examples of Shapley vectors. Exercises. Selected bibliography. Index.

C.A. COULSON (revised by A. Jeffrey), Waves: A mathematical approach to the common types of wave motion.

A. JEFFREY and I. ADAMSON, eds., Longman Mathematical Texts, Second Edition (Longman, London–New York, 1977) x+229 pp.

Preface to the second edition. 1. *The wave equation*: Introduction; General form of progressive waves; Harmonic waves; Plane waves; The wave equation; Principle of superposition; Special types of solution; List of solutions; Equation of telegraphy; Exponential form of harmonic waves; D'Alembert's formula; Innhomogeneous wave equation; Boundary conditions and mix problems; Extension of solutions by reflection; A solved example; Examples. 2. *Waves on strings*: The governing differential equation; Kinetic and potential energies; Inclusion of initial energies; Inclusion of initial conditions; Reflection at a change of density; Reflection at a concentrated load; Alternative solutions; Strings of finite length, normal modes; String plucked at mid-point; Energies of normal modes; Normal coordinates; String with load at its mid-point; Damped vibrations;

Method of reduction to a steady wave; Uniqueness of motion by the energy integral method; Examples. 3. *Waves in membranes*: The governing differential equation; Solution for a rectangular membrane; Normal coordinates for a rectangular membrane; Circular membrane; Uniqueness of solutions; Examples. 4. *Longitudinal waves in bars and springs*: Differential equation for waves along a bar; Free vibrations of a finite bar; Vibrations of a clamped bar; Normal coordinates; Case of a bar in a state of tension; Vibrations of a loaded spring; Waves in an anharmonic lattice; Examples. 5. *Waves in liquids*: Summary of hydrodynamical formulae; Tidal waves and surface waves; Tidal waves, general conditions; Tidal waves in a straight channel; Tidal waves on lakes and tanks; Tidal waves on rectangular and circular tanks; Paths of particles; Method of reduction to a steady wave; Surface waves, the velocity potential; Surface waves on a long rectangular tank; Surface waves in to dimensions; Paths of the particles; The kinetic and potential energies; Rate of transmission of energy; Inclusion of surface tension. General formulae; Capillary waves in one dimension; Examples. 6. *Sound waves*: Relation between pressure and density; The governing differential equation; Solutions for a pipe of finite length; Normal modes; Normal modes in a tube with moveable boundary; The velocity potential. General formulae; The differential equation of wave motion; An example; Spherical symmetry; The kinetic and potential energies; Progressive waves in a tube of varying section; Examples. 7. *Electric waves*: Maxwell's equations; Non-conducting media and the wave equation; Electric and magnetic potentials; Plane polarised waves in a dielectric medium; Rate of transmission of energy in plane waves; Reflection and refraction of light waves; Internal reflection; Partially conducting media, plane waves; Reflection from a metal; Radiation pressure; Skin effect; Propogation in waveguides; Examples. 8. *General considerations*: Doppler effect; Beats; Amplitude modulation; Group velocity; Motion of wave packets; Kirchhoff's solution of the wave equation; Fresnel's principle; Diffraction at a pin hole; Fraunhofer diffraction theory; Retarded potential theory; Wave propagation in an inhomogeneous medium; Examples. 9. *Nonlinear waves*: Nonlinearity and quasilinear equations; Conservation equations; General effect of nonlinearity; Characteristics; Wavefronts bounding a constant state; Riemann invariants; Simple waves; The piston problem; Discontinuous solutions and shock waves; Examples. Answers. Index.

K. SCHÜTTE, Proof Theory (Translation from the German by J.N. Crossley).

B. ECKMANN and J.K. MOSER, eds., A Series of Comprehensive Studies, Grundlehren der mathematischen Wissenschaften 225 (Springer-Verlag, Berlin–Heidelberg–New York, 1977) xii + 299 pp.

Preface. Introduction. Part A. Pure Logic: *I. Fundamentals*: §1. Classical Sentential Calculus: 1. Truth Functions. 2. Sentential Forms. 3. Complete Systems of Connectives. 4. A Formal Language for the Sentential Calculus. 5. Positive and Negative Parts of Formulas. 6. Syntactic Characterization of Valid Formulas. §2. Formal Systems: 1. Fundamentals. 2. Deducible Formulas. 3. Permissible Inferences. 4. Sentential Properties of Formal Systems. 5. The Formal System CS of the Classical Sentential Calculus. *II. Classical Predicate Calculus*: §3. The Formal System CP: 1. Primitive Symbols. 2. Inductive Definition of the Formulas. 3. P-Forms and N-Forms. 4. Positive and Negative Parts of a Formula. 5. Axioms. 6. Basic Inferences. §4. Deducible Formulas and Permissible Inferences: 1. Generalizations of the Axioms. 2. Weak Inferences. 3. Further Permissible Inferences. 4. Defined Logical Connectives. §5. Semantics of Classical Predicate Calculus: 1. Classical Models. 2. The Consistency Theorem. 3. The Completeness Theorem. 4. The Satisfiability Theorem. 5. Syntactic and Semantic Consequences. *III. Intuitionistic Predicate Calculus*. §6. Formalization of Intuitionistic Predicate Calculus: 1. The Formal System IP1. 2. The Formal System IP2. 3. Left and Right Parts of Formulas. 4. The Formal System IP3. §7. Deducible Formulas and Permissible Inferences in the System IP3: 1. Generalizations of the Axioms. 2. Weak Inferences. 3. More Permissible Inferences. 4. Special Features of Intuitionistic Logic. 5. Properties of Negation. 6. Syntactic Equivalence. §8. Relations between Classical and Intuitionistic Predicate Calculus: 1. Embedding IP3 in CP. 2. Interpretation of CP in IP3. §9. The Interpolation Theorem: 1. Interpolation Theorem for the System IP3. 2. Interpolation Theorem for the System CP. 3. Finitely Axiomatisable Theories. 4. Beth's Definability Theorem. *IV. Classical Simple Type Theory*: §10. The Formal System CT: 1. The Formal Language. 2. Chains of Subterms. 3. Axioms and Basic Inferences. 4. Deducible Formulas and Permissible Inferences. 5. The Cut Rule. §11. Deduction Chains and Partial Valuations: 1. Definition of Deduction Chains.